

THE
ANTIQUITY & EXCELLENCY
Of
GLOBES.

What a Globe is, and of the Circles
without the Globe, what the Horizon is with the
things described thereon, also what the Meridian is,
the Poles, Axes, Equi-Circle and Index.

Moreover of the

Circles which are described on the superficies of the
Globes; of the equinoctial circle, Zodiack, and Ecclip-
tick, of the Tropicks, what the Artick and An-
tartic Circles are; of the Verticall Circles, and
quadrant of Latitude, of the Zones and their
numbers of Climates and Paralels.

All which are proper to the Celestiall and Terrestiall
Globes, with their uses, profitable for all that would
be instructed in Geography.

*He stretcheth out the North over the empty place, and hangeth the
Earth upon nothing, Job 26. 7.*

L O N D O N
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Geographie and the Principles thereof

Certaine termes of Land and Water plainly defined and described



The Terrestiall Globe is defined to be a Sphericall body, proportionably composed of Earth and Water : into which two parts it is divided. Whereof the Earth comes first to view ; whose parts are, either

Reall, } and the reall parts either { Continents,
Imaginary : } Islands.

Now a Continent is a great quantity of Land, not interlaced or seperated by the Sea ; in which many Kingdomes and Principalities are contained ; As Europe , Asia , Africa , America.

An Island (called in Latine, *Insula, quasi in salo*) is a part of the earth, environed round with waters ; as Britaine, Java, St. Laurence Isle, Bermudas.

These againe are sub-divided into { *Peninsula,*
 Isthmus,
 Promontorium.

A *Peninsula*, is almost an Island ; that is, a tract of Land, which, being almost encompassed round by water, is joyned to the firme Land by some little isthmus : as Poloponnesus, Taurica, Cymbrica, and Parvana.

An *Isthmus* is a little narrow neck of Land, which joyneth any *Peninsula* to the continent ; as the straits of Dariene in Peru, and Corinth in Greece.

Promontorium, Is some high mountaine, which shooteth it selfe into the Sea, the utmost end of which is called a Cape, as

that great Cape of good hope, and Cape Verde in Africa; Cape Comori in Asia, and that of Saint Michaels Mount in Cornwall; the North Cape up in Norway, and divers others.

There are likewise other reall parts of the earth; as mountaines, vallies, fields, plaines, woods and the like.

The other generall part of the Globe is the water; which is

Divided into $\left\{ \begin{array}{l} 1 \text{ Oceanus.} \\ 2 \text{ Mare.} \\ 3 \text{ Fretum.} \\ 4 \text{ Sinus.} \end{array} \right.$

1 *Oceanus*, The Ocean is that generall collection of all waters which invironeth the whole world on every side.

2 *Mare*, The Sea is part of the Ocean; to which we cannot come, but through some strait, as *Mare Mediterraneum*, *Mare Balticum*, and the like.

These two take their names

Either from the adjacent places, as the British Ocean, the German Sea, the Atlantick Sea.

Or from the first discoverer, as *Mare Magellanicum* Davis and *Forbissers* straits, &c.

Or from some remarkable accident, as *Mare Rubrum*, from the red colour of the sands. *Mare Aegeum*, *Pontus Euxinus*, and the like.

3 *Fretum*, a Strait is a part of the Ocean, restrained within narrow bounds, and opening a way to the Sea; as the straits of Gibraltar, Hellespont, Anian.

4 *Sinus*, a Creek, is a crooked shoar, thrusting out as it were two armes to imbrace the lovely presence of the Sea; as *Sinus Adriaticus*; *Sinus Persicus*, and *Corinthiacus*.

To this also belong Rivers, Brooks, and Fountains, which are engendred of congealed aire in the earths concavities, and seconded by the Sea waters, creeping through hidden crannies thereof. Thus much of the real parts of the Globe in generall.

Of the Circle of the Map and their uses.

The Earth and Sea, composed themselves in a Sphericall figure, and is caused by the proper inclination of each part, which being heavy falls from every poynt of the circumference, and claps about the center, there settles as near as it may towards his place of rest: we may illustrate both the figure and scituation by a familiar similitude to an ingenious apprehension; Suppose we a knot to be knit in the midst of a Cord that hath many ends, and those to be delivered to sundry men of equall strength to be drawn severall wayes round from every part above, and below, and on each side.

Questionlesse while every man draws in the boes of the knots, it must needs become round, and whilst they continue to pluck with equall strength it must rest immoveable in the middle betwixt them, since every strength that would destroy, hath a strength equall to resist it; so it is in the bosome of the earth where every part wheelles upon equall priviledge of nature, nor can any presse farther then the center to destroy this compacted figure, for it must meet there with a body that will oppose it, or if not, yet could it not passe, since every motion from the middle were to ascend, which nature will not permit in a body of weight as the whole earth is.

The compasse of the whole is cast by our latest and most learned, to be 21600 English miles, which though none ever yet so pared as to measure them by the foot, yet let not the ignorant reject this accompt, since the rule by which they are led cannot faile: for we see by continuall experience, that the Sun for every degree in the Heavens, gaines sixty miles upon the earth, towards his circuit round, and after three hundred sixty degrees, returneth to the same poynt in respect of us as before it was: repeat the number of 60 so oft and you will finde the accompt just, and so by proportion of the circumference to the diameter, which is *triplo sesqui-septima*, the same which 22 hath to 7. We may judge likewise of the earths thicknesse to the center. The whole diameter must by rule be somewhat lesser then a third part of the circuit, that in proportion to 21600 will be 6872. halfe the number will reach the

the middle of the world, and that is 3436. in this report both of the quantity and forme of the earth; we must not require such exactnesse as cannot vary a haire breadth, for we see the mountaines of the earth, and oftentimes the waves of the Sea make the superficies unequall, it will be sufficient if there be no difference, sensible to be reckoned in so great a *bulk*; for let us rudely hew a ball out of rough stone, still it is a ball, though not so smooth as one of Christal, or suffer a mote to fall upon a speare of glass, it changeth not its figure, far lesse are the mountains which we see in respect of the whole lump.

what a Globe is.

A Globe we may define to be an Analogicall representation either of the Heavens, or of the earth, and we call it Analogicall, not only in regard of its forme, expressing the figure of the Heavens, as also of the terrestiall Globe, consisting of the earth it selfe, together with the interflowing Seas, but rather, because that it representeth unto us in a just proportion and distance each particular constellation in the Heavens, and every severall region and tract of ground in the earth, together with certaine circles, both greater and lesser, invented by artificers for the more ready computation of the same.

The greater circles we call those which divide the whole superficies of the Globe into equall parts or halves and those the lesser which divide the same into two unequall parts.

Besides the body of the Globe it selfe, there is also annexed a certaine frame, with necessary instruments thereto belonging.

The Fabrick of the frame is thus; first of all there is a base or foot to rest upon, on which, there are raised perpendicularly six pillars or columnes of equal length and distance, upon the top of which there is fastned to a levell a round plate or circle of wood, which they call the Horizon, because that the uppermost superficies thereof performs the office of the true horizon, for it divideth the whole Globe into 2 equal parts; whereof that which was uppermost, representeth unto us the visible Hemisphere, and the other, that which is hid from us. So likewise the circle which divideth that part of the world which

which we see from the other, which we see not is called the Horizon, and that poynt which is directly over our heads in our Hemisphere, and is on every side equadistant from the Horizon, is commonly called Zenith, and that poynt which is opposite to it in the lower Hemisphere, is commonly written Nadir these two poynts are called also the Poles of the Horizon.

Furthermore, upon the superficies of the Horizon in a materiall Globe, there are described first, the twelve signes of the Zodiack, and each of these is divided againe into thirty lesser portions, so that the whole Horizon is divided into 360 parts, which they also call degrees, and every degree is divided into sixty parts, also each of them is called a scruple or minute, and so by the like subdivision of minutes into sixty parts will arise seconds, and of these thirds, and likewise fourths, and fifts, &c. but the like partition still of each into sixty parts.

There is also described upon the Horizon, the Roman Calender, and that three severall wayes, to wit, the ancient way, which is still in use with us here in England, and the new way appointed by Pope Gregory 23, wherein the *Æquinoxes* and *Solstice* were restored to the same places they were in at the time of the Celebration of the councell of Nite, and in the third, the said *Æquinoctiall* and *Solsticall* points are restored to the places they were in, at the time of our Saviour Christs nativity.

The months in the Calender, are divided into dayes and weeks, to which are annexed as their peculiar characters the 7 first letters of the Alphabet.

The innermost border of the Horizon, is divided into thirty two parts, according to the number of the winds, which are observed by our moderne Sea-faring-men in their Navigations, by which also we are wont to designe forth the quarters of the Heavens, and the Coasts of Countries, the names of the windes are set downe both in English and Latine, in the Horizon of the materiall Globes.

The use of the Horizon is manifold, First it divides the heavens into 2 Hemispheres; Secondly it shews what stars never set, and what never rise from under the earth, and so likewise what stars doe both rise and set; Thirdly, it sheweth the
cause

cause of the equality and inequality of the artificiall dayes and nights ; Fourthly, it conduceth to the finding out of the latitude of any place ; Fifthly, it is the cause of the rectitude and obliquity of the Sphear, whereof we have occasion to speake more largely hereafter.

There is also let into this Horizon two notches, opposite one to the other, a circle of brasse, making right angles with the said Horizon, and placed so that it may be removed at pleasure up and downe by those notches, as need shall require ; This Circle is called the Meridian because that one side of it which is in like manner divided into 360 degrees, supplyeth the office of the true Meridian. Now the Meridian is one of greater circles, passing through the Poles of the world, and also of the Horizon, to which when the Sun in his daily revolution is arrived in the upper Hemisphere it is mid-day, and when it toucheth the same in the lower Hemisphere it is mid-night at the place whose Meridian it is.

The Meridian (which comes first to be considered) is a great Circle compassing round the Earth from Pole to Pole ; and is that which you see in the circumference of both Planispheres of the Map, and wherein are written the names of the Zones and Climates, This chiefe, first fixed Meridian passeth through the Islands called Azores, according to the ancient Cosmographers ; and there are two reasons why they did there begin to reckon the longitude of the Earth.

First, for that at that time there was no land known further to the Westerne then that place.

Secondly, Under that Meridian the Needle in the Marriners compasse had no variation, but did poynt directly North and South.

There be also many Meridians according to the divers places in which a man lives, the number of them equall to so many points as may be imagined in the Globe ; but the usuall setting them known to view, is by ten degrees a sunder ; and are those black lines which you see in both Planispheres, running downe along from the North to the South Pole.

The use of the Meridian, is to shew the longitude of any place. Now the longitude of a Region, City or Cape, is the distance of it East from the first great Meridian ; and this longitude

gitude is measured and numbred in the *Æquinoctiall* line by Meridians from the generall and fixed Meridian into the East, and containeth the whole compasse of the Earth, viz. 360. degrees.

To prove this by example, cast your eye on *London*, and you shall see it something to the East of the second black Meridian: passe downe with that black line to the *Æquinoctiall*, and look as much East there, as *London* is from that Meridian above, then count the degrees of the *Æquinoctiall*, from the first great Meridian to that place, and that distance is the longitude of *London*, which you may perceive to be 20 degrees and better: And the like manner of working is to be made for all other places.

That line full of degrees crossing both Planispheres straight along in the middle, and dividing the world into two halves (*viz.*) North and South halves; is called the *Æquinoctiall line*, or the *Æquator*; either because it is of equall distance from both Poles of the world, or else because the Sun coming in this Circle makes the dayes and nights throughout the world of a length; which happens upon the 10. or 11. of March, and the 13. or 14. of September. It passes through *Abassia* or *Prester Johns* Kingdome, and *Manicongo* in Africa, through the great Island *Sumatra*, and the *Maldiv*e Isles of Africa; and in America, through *Guiana*.

The use of it is to shew the latitude of any Countrey, City, Promontory, or the like: Now the latitude is the distance of a place toward the South or North, from the *Æquinoctiall* line or middle of the world; and is reckoned and measured upon the Meridian toward either Pole. Those therefore have Northerne latitude that inhabit between the *Æquinoctiall* and the North Pole, as they have Southerne latitude that are between the same Equator and the South Pole.

Those black lines thwating the black Meridian from East to West, are parallels, and are also called *Æquidistants*, being distant one from another 10 degrees toward both Poles; and are here set downe for the easie counting the latitude of any place from the *Æquinoctiall*: as for the latitude of *London*; count so many decimall Parallels, till you come to the Parallel which is nearest *London*, (you shall finde them to be five) then follow that line to the Meridian, and see the figures set

thereat; they are 50.) moreover, add to that number of 50. so much as London is situate above that paralel, the space is one degree and an halfe; thus you shall finde the latitude of *London* (that is, the distance thereof from the *Aequator* toward the North Pole) to be 51 degrees and a halfe: and in like manner must the latitude of all other places be sought. Thus much of Longitude and Latitude, by which two, the whole earth is reckoned.

The Meridian and *Aequinoctiall*, as also the *Zodiack*, are filled throughout with degrees, the number 360 and every degree consists of 60 minutes, and containes, according to our ordinary account, 20 leagues, or 60 miles.

The great circle that is drawn bending bias in one planisphere up to the Tropick of Cancer, in the other downe to the Tropick of Capricorne, is the *Zodiack*; it is replenished with degree, and beares on it the Characters of the twelve signes.

The uses of it are to shew over what Countreyes and people the body and beames of the Sun come perpendicular at some times or other in the year, and it shewes to all (where the days increase and decrease) the longest and shortest days of the year, for the Sun (which causeth the same) being alwayes in this circle and therein moving about one degree a day, all the while he is coming up from the Tropicke of Capricorne to that of Cancer, the dayes increase in the Northerne Climates: but contrariwise in his course back from Cancer to Capricorne they shorten to us, and lengthen to those in the Southerne Climates; and this Circle shews the foure quarters of the yeare; Spring, Summer, Autumne, Winter.

The Tropick of Cancer, (so called, or the Celestiall signe Cancer) is a circle, whose distance from the *Aequinoctiall* toward the North, is 23 degrees and a halfe. When the Sun is come so far Northward as to touch this Circle, then is our longest day in the year.

It passes through the Sonthermost parts of *Barbary* and *Egypt*, *Arabia*, *India*, *China*, *Nova Hispania*, and the Island *Cuba*.

The Tropick of Capricorne, (likewise so named of the signe Capricorne in the starry Heaven) is a circle of like distance at the

the other Tropick from the *Æquinoctiall* Sou. hward, that is 23 degrees and a halfe. When the Sun is gone downie to the Circle Southward, it is our shortest day in the whole year.

This Tropick passes through Monomopata, Saint Laurence Island, Peru, and the South coasts of Brasile.

The Artick, or North polar Circle, is distant from the North Pole, 23 degrees and a halfe; so much as the Tropick of Cancer from the *Æquinoctiall*; but the distance between that Tropick and it, is 43 degrees.

You may see it passe through Island, Norway, Boddia, Moscovy, Tartary, crosse *Davis* Straits, and Greenland.

The Antartike or South polar Circle, is distant from the South Pole, 23. degrees and a halfe; so far as the Tropick of Capricorne is from the *Æquinoctiall*.

The Circle passes through Magellanica, or *Terra australis Incognita* onely.

Now these four lesser circles, (*viz.*) the two Tropicks, and Polar circles, doe fitly part the Earth into five Zones.

The Zones.

A Zone is a space of Earth, contained between two of the smaller circles, or within the compasse of either Polar Circle: the name signifies as much as a girdle, by reason that each Zone compasseth about the Earth in manner of a girdle. Of these there be two kinds, one temperate, the other untemperate.

There be two temperate Zones; the one North, the other South.

The North temperate Zone is that space of earth contained between the Tropick of Cancer, and the North Polar Circle.

The South temperate Zone is that space of earth stretched along between the Tropick of Capricorne, and the South Polar Circle.

They are called temperate Zones, for that the aire thereof hath a far better and more moderate temperature, and meeter for man to inhabit, then the untemperate Zones. The breadth of them is forty three degrees a piece, which degrees make either temperate Zone to be 2580 English miles broad a piece.

The untemperate Zones are twofold, one exceeding in the extremity of heat, the other as much in cold; they have been thought in former times altogether uninhabitable, but latter experience hath found them more fit for habitation,

The Torrid or burnt Zone (which is the hot untemperate Zone) is that space of Heaven which you see contained between the Tropick of Cancer, and that of Capricorne. It hath the name of Torrid, because the Sun continually passes thereover, and casting down direct rayes, affects it with a marvellous heat; thereby making it not so inconvenient for the Inhabitants, as the temperate Zones are. The breadth of this Zone is comprehended between the two Tropicks, and contains 47 degrees, that is of English miles 2820.

The frozen Zones are spaces of Earth inclosed within either of the Polar Circles: of these there are two, one North, the other South.

The North frozen Zone, is that space of Earth contained within the compasse of the North Polar Circle. The breadth thereof reckoned twenty three degrees and a halfe, viz. from the Pole it selfe to the Polar Circle, which of English miles is 1410.

The South frozen Zone, is that space of Earth compassed all about with the South Polar Circle: It hath the like breadth from the South Pole, as the other frozen Zone hath from the North Pole: and likewise the number of miles is the same.

They are called frozen Zones, because they (for the most part) exceed in cold; and that is caused in regard that the Sunne for a good part of the year, is under the Horizon, and sees them not; and when he is come up into their sight, his appearance which (for a pretty long season together) rather comforts them, then any vertuall heat proceeding from him; for there the Aire is stuf with thick foggy vapours, and his

his beames at highest fall but very obliquely on them ; so that what through his want and inability to dispel the cold and the colds force to resist, and beare back the Suns heat ; these Zones remaine almost uninhabitable, and even (as the word is) frozen.

The names of all these, set in the right place of each Zone you shall see in that Meridian going about America and Magellanica.

Of the Climates.

IN that great Meridian going about Europe, Asia, and Africa, are described the Climates ; Now a Climate is a space of the Earth included within the space of two Parellels. The use of them is to shew the difference of length and shortnesse of dayes over all the world, as you may see in the midst of every Climate, set the number of the houres of the longest day in the year, under that Climate : the longest day in one Climate, differing halfe an houre from the longest in another. so that there are four and twenty Climates, consisting of forty eight Parellels, ere the day come to be twenty foure hours in length, which is twelve houres longer then the ordinary Equinoctiall day is. Now this is to be understood ; Under the Equinoctiall line, and thirteen degrees, that is, three Parellels, on either side thereof, the dayes exceed not the length of twelve houres, but after in every Clime increase the length of halfe an houre, so that there are numbred (as is said before) 48 Parellels, which make twenty four Climates ; before the dayes become twenty foure houres long, the which length they being grown to, their increase is then by whole weeks and months, till in the four and twentieth Clime : about the Pole, the day is full halfe a year long. And it is thus between the Equator and the North Pole, so it is between the said Equator and South Pole : wherefore there are 2 sorts of Climes, that is 24 Northerne, and as many Southerne. The Climates Northward are thus named ; the first is *Dia Meroes*, because the middle Parallel thereof passes through the middest of the Inland Iland *Meroe*, in the continent of *Africa* ; the second is *Dia Sienes* : the third *Dia Alexandria* ; the fourth *Dia Rhodos* the fifth *Dia Rames* ; the sixth *Dia Ponton* ; the

the seventh *Dia Boristhenes* ; the eight *Dia Ripheos* ; the ninth *Per Dianam*. The South Climes have the same names, save only that the word *Anti* is thereunto added ; as *Anti Dia Meroes* ; the next *Anti Dia Sienes*, and so along to the ninth Southward : further then the ninth Clime on either side the Equinoctiall they are not named but yet the Climes run on both wayes to the number of twenty four, as is seen in the Meridian. That there be but nine named ; the reason is, because when these names were given, no more then nine Climates were known to those of ancient times ; but since, though the number of them be increased to twenty foure, the rest are not knowne by proper names, but remaine inanimate.

In the two opposite points of this Meridian are fastned the two ends of an iron pin, passing through the body of the Globe and its centre, one of which ends is called the Artick, or North pole of the world ; and the other the Antartick or South Pole ; and the pin it selfe is called the Axis ; for the Axis of the world is the Diameter about which it is turned, and the extreame ends of the Axis are called the Poles.

To either of these Poles when need shall require there is a certaine brasse Circle or ring to be fastned ; which Circle is divided into twenty four equall parts, according to the number of the hours day and night, and it is therefore called the hour-circle, and this Circle is to be applied to either of the Poles in such sort as that the section where twelve is described may precisely agree with the points of mid-day and mid-night in the superficies of the true Meridian.

There is also another little pinne to be fastned to the end of the Axis, in the very Center of the hour circle ; this pin is so made as it turnes about and poynteth to every of the twenty four sections in the hour-circle, according as the Globe it selfe is moved about, so that you may place the point of it to what houre you please.

The use of this hour-circle and Index, is to denote the houres of the rising and setting of the Sun, and other stars, which must be practised after this manner ; First you must set the Globe to your elevation or pole, and then apply the degree of the signe in which the Sun at that time is, to the Me-

Meridian and the Index to that 12 houres which is uppermost, and so having thus done you must turne the Globe about till the degree wherein the Sun is come to the Easterne side of the Horizon; which done the Index will poynt out the houre of his rising, and if you turne it about to the West side, you shall in like manner have the houre of his setting.

There is also belonging to the Meridian, a quadrant of Altitude, being made of a long thin plate, of steel or brasse, and fashioned crooked, so that it may be applyed to the convexe superficies of the Globe.

And having the fourth part of the Circle in length and this Quadrant is made in such sort as that it may be fastned on the Meridian, and so be applyed to the Zenith of any place whatsoever, being divided from one end to the other into 90 equal parts and degrees.

There is besides at the foot of the Globe, a Mariners compasse placed, which serves to shew how to place the Globe rightly, according to the four windes and quarters of the world.

Besides these Circles expressed in the Globe, there are also some certaine other Circles in familiar use with the Practicall Astronomers, which they call verticall Circles; these are greater Circles drawn from the verticall poynt through the Horizon, in what number you please; the office of these Circles is supplied by the helpe of a quadrant of altitude which is a thin plate of brasse divided into 90 degrees; this Quadrant must be applyed to the vertex of any place, when you desire to use it, so that the lowest end of it noted with the number of 90, may just touch the Horizon in every place, this Quadrant is made moveable, that so it may be fastned to the verticall point of any place.

Of the figure of the heavenly Orbes and Elements.

THe whole world is divided into two parts, viz. *Elementall*, and *Etheriall*, or *Cælestiall* parts.

The Elementall part is four-fold; viz. *Earth*, *water*, *aire*, *Fire*, as may be seen in that round figure of the frame of the Heavens and Elements one within another; the inmost and

middlemost Circle containing Earth and water intermixed together; the next, the three Regions of the Aire, and immediately above that Orbe, is the Element of Fire, all which you may easily discern by their severall names in their proper places.

The Etheriall or Celestiall parts doe compasse the Elementall part, and contain the ten upper Spheares, viz. 1 *The Moon*, 2 *Mercury*, 3 *Venus*, 4 *Sol*, 5 *Mars*, 6 *Jupiter*, 7 *Saturne*, 8 *the starry Firmament*, 9 *the Christaline Heaven*, having no stars at all; the 10. is the *Primum mobile*, or first mover, containing all the rest within it; and moving from the East to the West carrieth about with it in violence all the other Spheares,

The rest of the Spheares have contrary motions, every one in his kinde, though far slower then the other: and their motions are contrary, from the West to the East, and so are carried about oftentimes by the first mover, before they make one perfect revolution in themselves.

The *Christaline* or ninth Sphear his motion is almost imensible, and is called the trembling Motion, and is performed, according to the opinion of later Astronomers, in 49000 years.

The eight Sphear being the Starry Firmament performeth his motion in 7000 years.

The rest of the Sphears are the seven Planets, each Sphear containeth in it but one Star: whereof the uppermost and slowest is *Saturne*, which perfecteth his course in thirty yeares. *Jupiter* being next under that, makes his revolution in twelve years. *Mars* beneath him finisheth his course in two years. *Sol* passeth through the Zodiack in 365 dayes and six houres, which is one whole year. *Venus* ends her course in somewhat more then a year. *Mercury* holds equall pace with the Sun. *Luna* courseth about the Heaven once every eight and twenty dayes.

A Star of the first bignes, is 107 times bigger then the earth.

A Star of the second bignes, is 90 times the Globe of the earth.

A Star of the third bignes, is 72 times the Globe of the earth.

A Star of the fourth bignes, is 54 times the Globe of the earth.

A Star of the fifth bignes, is 36 times the Globe of the earth.

A Star of the sixth bignesse, is 18 times the Globe of the earth.

Of the use of the Globes.

THe first whereof ~~is~~ concerning the position of the Globe, and the other Climates. Now touching the position of the Globe, you are first of all to take care that it be placed perpendicularly to the true Horizon; Secondly, That the distinction of the winds answer directly to the windes of the reall Horizon, that so the East on your materiall Globe may look directly towards the true East of the world; for which purpose especially there is usually placed a Nauticall compasse in the bottom of the frame. When you have thus placed your Globe so that it may be turned any way at pleasure, yet so that the base or foot be not moved out of its place. The next thing that is to be inquired after, is the latitude of the place wherein you live, which according as it is greater or lesse, you must elevate the Pole of your Globe above the Horizon proportionably. As for example, if the latitude be 30, 51, or 52. grad. or more or lesse Northward, then must you elevate the Artick Pole, just so many degrees above the Horizon, and so likewise if the latitude be Southerne, you must doe the like by the Antartick or South Pole, But under the Equator where there is no latitude at all both the Poles must be placed in the very Horizon at opposite points.

Now if you desire to know the longitude of any place expressed in the Globe, you must apply the same place to the Meridian, and observing at what place the Meridian cutteth the Equator, reckon the degree of the Equator from the Meridian of St. Michaels Island to that place; for so many are the degrees of longitude of the place you look for.

In the same manner you may measure the difference of longitude betwixt any other two places that are described in the Globes.

Now if you desire to finde the latitude of any place expressed in the Globe, you must apply the same to the Meridian, and reckon the number of the degrees that it is distant from the Equator, for so much is the latitude of that place.

To finde the distance of two places, set your Globe in such sort, as that the Zenith of one of the plates be 90 degrees di-

stant every way from the Horizon, and then fasten the Quadrant of altitude to the verticall point and so move it up and downe untill it passe through the vertex of the other place, the number of the degrees intercepted in the Quadrant betwixt the two places, being resolved into furlongs, miles or leagues, as you please, will shew you the true distance of the places assigned, and the other end of the Quadrant that toucheth upon the Horizon will shew on what winde or quarter of the world the one place is in respect of the other, or what angle or position it hath, for the angle or position is that which is comprehended betwixt the Meridian of any place, and a great Circle passing through the Zeniths of any two places assigned, and the quantity of it is to be numbred in the Horizon.

As for example, The longitude of London is 26 degrees and it hath in Northerne latitude 51 degrees and a halfe. Now it is demanded, what distance and angle of position it beareth to Saint Michaels Island, which is one of the Azores; we must proceed thus to finde it; first, let the North Pole be Elevated 51 degrees which is the latitude of London, then fastning the Quadrant of altitude to the Zenith of it, that is to say 51 degrees and an halfe Northward from the Æquator; we must turne it about till it passe through Saint Michaels Island, and we shall finde the distance intercepted betwixt these 2 places to be 11 degrees, 40. m. or thereabouts, which is 280 of our leagues, and if we observe in what part of the Horizon the end of the Quadrant resteth we shall finde the angle of position to fall neer upon 50 gr. betwixt South-west and by-west, and this is the Situation of this Island in respect of London. The distance of places differing only in latitude may be found out after this manner; First, you must subtract the lesser latitude from the greater, resolving a degree into minutes, if the subtraction cannot be done otherwise conveniently; then multiply the degrees by 15, and divide the minutes by 4. and the sum produced will be the distance of those two places in common Germane miles, one whereof containeth four of our English miles.

To finde delineation of the Sun for any day given.

HAVING first learned the day of the Month, you must look for the same in the Callender described on the Horizon of your Globe, over against which in the same Horizon you shall finde the signe of the Zodiack, and the degree of the same that the Sun is in at that time, but if it be leap year, then for the next day after the 28th of *February* you must take that degree of the signe which is ascribed to the day following; As for example, if you desire to know what degree of the Zodiack the Sun is in the 29th of Febru. you must take that degree which is assigned for the first of March, and for the first of March take the degree of the second, and so forward.

Now when you have found the place of the Sun, apply the same to the Meridian, and reckon thereon how many degrees the Sun is distant from the *Æquator*, for so many will the degrees be of the Suns declination for the day assigned; for the declination of the Sun, or of any other Star, is nothing else but the distance of the same from the *Æquator* reckoned on the Meridian.

You also finde out the Suns greatest declination by his greatest and least altitude, both in Summer and Winter, by subtracting the least out of the greatest, for then halfe that which remaineth will be the declination you seek for.

Now to know the longitude of the Sun for any time, that is to say in what degree of the Zodiack he is, you must doe thus, seek in the limbe of the Horizon for the day of the month for which you would know the longitude of the Sun, which found, you shall see over against it, among the signes of the Zodiack described also upon the Horizon the degree of the signe that exactly answereth to it, and which is the place of the Sun for that day and month, but if it be leape year you must remember after the 28th of *February* to adde one day more still as you goe, as if you would looke for the place of the Sun on the 13th of March, you must take that degree which is set for the 14 of March which is the 3 gr. of *Libra*.

To finde the latitude of any place.

HAVING found the place of the Sun in the Eccliptick, Apply the same to the Meridian, and so move the Meridian up and down through the notches it stands in, untill the place of the Sun be elevated so many degrees above the Horizon as the Suns altitude is ; and the Globe standing in this position the elevation of either of the Poles will shew the Latitude of the place wherein you are.

The like effect may be wrought by observing the Meridian altitude of any other Star expressed in the Globe, for if you set your Globe so as that the Star you mean to observe be so much elevated above the Horizon, as the Meridian altitude of it is observed to be the elevation of the Pole above the Horizon will shew the latitude of the place.

To finde the latitude of any place by knowing the place of the Sun or other Star, and observing the altitude of it two severall times, with the space of time betwixt the two observations.

First having taken with your compasses the complement of the altitude of your first observation, now the complement of the altitude, is nothing else but the difference of degrees by which the altitude is found to be lesse then 90 degrees you must set one of the feet of your compasses in that degree of the Eccliptick that the Sun is in at that time, and with the other describe a Circle upon the superficies of the Globe, tending somewhat toward the west, if the observation be taken before noon, but toward the East if it be made in the afternoon ; then having made your second Observation, and observed the space of time betwixt it and the former, apply the place of the Sun to the Meridian, turning the Globe toward the East untill that so many degrees of the Equator have passed by the Meridian as answer to the space of time that passed betwixt your observations, allowing for every hour 15 degrees in the Equator, and marking the place in the parallel of the Suns decli-

declination, that the Meridian crosseth after this turning about of the Globe, and then setting the foot of your compasses in the very interfection, describe an arch of a Circle with the other foot of the compasse, extended to the complement of the Second observation, which arch must cut the former Circle, and the common interfection of these two Circles, which shew the verticall poynt of the place wherein you are, so that having reckoned the distance of it from the Equator, you shall presently have the latitude of the same.

The same may be effected if you take any Star and worke by it after the same manner, or if you describe two Circles mutually crossing each other to the complements of any two Stars.

Seeing the Zenith or vertex of every place is distant a quarter of a Circle, that is 90 degrees from the Horizon, if then the Sun being in either of the Equinoctiall poynts, the Meridian altitude be subtracted from 90 degrees, the remainder will be the distance betwixt the Zenith of the place, and the Equinoctiall Circle, which will be the latitude of the same place,

To finde the houre of the day, Rising and setting of the Sunne.

WOrk thus, First set your Globe to the latitude of your place, then having found out the place of the Sun for the time assigned, apply the same to the Meridian, and with all you must set the poynt of the houre Index at the figure 12 in the houre Circle, and having thus done, you must turne about the Globe toward the East part, till the place of the Sun touch the Horizon, which done, you shall have the amplitude of the Suns rising, also in the Equator which you must reckon as we have said, from the East point or place of interfection, betwixt the Equator and the Horizon, and then if you but turne the Globe about to the West side of the Horizon, you shall in like manner have the houre of his setting and Occidental amplitude.

To

To find out the Longitude, Latitude, and declination of any fixed Star as it is expressed in the Globe.

Take the Quadrant of altitude, or any other Quadrant of a Circle, that is but exactly divided into 90 parts, and lay one end of it on either Pole of the Eccliptick, either Northerne or Southerne, as the latitude of the Star shall require, then let it passe through the Centre of the Star, to the very Eccliptick, and there the other end will shew the degree of the Longitude of the same which you must reckon from the beginning of Aries, and so that portion of the Quadrant that is contained betwixt the Star it selfe and the Eccliptick, will also shew the Latitude of the Star.

The declination of a Star is the distance of it from the Æquator which distance must be reckoned one greater circle passing through the Poles of the Æquator: and therefore if you but apply one Star to the Meridian you shall presently have the declination of it, if you account the degrees and minutes of the Meridian (if they be any) that are contained betwixt the Center of the Star and the Æquator.

Of the Constellations of the Northerne Hemisphere,

The first is *Ursa minor*, the lesser beare, in this constellation are reckoned seven Stars,

The second is *Ursa major*, the great beare, in this constellation are reckoned twenty seven Stars, some say but twenty foure, both the beares are called a Wagon or Chariot, but this name doth properly appertain to those seven bright stars in the great beare, which do something resemble the forme of a Wagon.

The Third. The Dragon: In this constellation there are reckoned 31 stars.

The fourth is Cepheus to this constellation, they reckon in all 11, among which, that which is in number the 4th, is called in Arabick, Alderamin, which signifieth the right arme.

The fifth is Bootes; which signifieth an Herds-man, or
one

one that driveth Oxen ; betwixt the leggs of this Constellation there stands an unformed Star of the first magnitude which is called Arcturus, the whole Constellation consisteth of 22 Stars.

The sixth Constellation is *Corona Borea*, the North Crowne the whole Constellation consisteth of 8 Stars.

The seventh is *Hercules*, It resembleth one that is weary with labour ; this Constellation hath 8 Stars, besides that which is in the end of his right foot, which is betwixt him and Bootes and one unformed Star at his right arme.

The eighth is the *Harpe*, It consisteth of ten Stars, but *Timochares* attributed to it but 8 ; and *Alfraganus* 11, the bright Star in this Constellation being the first in number.

The ninth is *Gallina*, the Hen or Swan, to this Asterisme is attributed, besides those two unformed near the left wing, 17 Stars.

The tenth is *Cassiopea*, the Lady in the chear, it consisteth of 13 Stars.

The eleventh is *Pegasus*, bearing the head of *Medusa*, for that Star which is on the top of the left hand is called the Devils head ; this Constellation hath, besides those 3 unformed, 26 other Stars.

The twelfth is *Auriga* the Wagoner, this Asterisme hath 14 Stars, of which that bright one in the left shoulder, which is also the third in number, is called *capra* a Goat, and the two which are in his left hand, and are the 8th. and 9th. are called *Hadikids*.

The thirteenth is *Aquila* the Eagle ; In this Asterisme are reckoned nine Stars, besides six other unformed.

The fourteenth is the Dolphine, and it hath in it tenne Stars.

The fifteenth is called in Latine *Sagitta*, the Arrow or Dart, it containeth 5 Stars in all.

The sixteenth is *Serpentarius* the Serpent bearer, it consisteth of 24 stars, and five other unformed.

The seventeenth is *Serpens*, the Serpent, It consisteth of 18 stars.

The eighteenth is *Equiculus* the little horse, it consisteth of 4 obscure stars.

The

The nineteenth is *Pegasus*, the great Horse, it hath in it ten Stars.

The twentieth is *Andromida*, the chained woman, this Constellation containeth in it 23 Stars.

21 is *Triangle*, it consisteth of four Stars; Among all these constellations in the Northerne Hemisphære, which are in all 21, there are but three Stars only of the first magnitude, the first of which is that in the left shoulder of *Erichthoneus*, or the Wagoner, called in Latine *Capella*: the second is the bright Star in the Harpe; the third is *Arcturus* betwixt the legges of *Bootes*. Now the whole number of Stars in this part of the Heavens, reckouing in these also which are of the 2, 3, 4, 5, and 6th magnitude, with the obscure and cloudy ones also, amounteth to 360.

Of the Northerne Signes of the Zodiack.

The first is *Aries*, the Ram; This Constellation hath thirteen Stars, some reckon but twelve, besides the other 5 unformed Stars that belong to it.

The second is *Taurus*, the Bull; in the eye of this Constellation is a very bright Star, and those 5 stars that are in his forehead are called in Latine *Sucula*, they usually cause raine and stormy weather; those other 6 or rather 7 stars that appeare on the back of the Bull the Greeks call *Plyades*, perhaps from their multitude; this Constellation hath 33 stars in it, besides 11 unformed stars that belong to it.

The third is *Gemini* the Twins. these some will have to be *Easter* and *Pollux*; others *Apollo* and *Hercules*; it containeth in it 18 stars, besides the seven unformed.

The fourth is *Cancer* the Crab, consisting of 9 stars, besides 4 unformed.

The fifth is *Leo*, the Lion, in the breast whereof is a very bright star, being the 8th in number; this Constellation containeth in it 27 Stars, besides 8 unformed, of the unformed Stars which are betwixt the hinder parts of the Lion they have made a new Constellation.

The sixth is *Virgo*, the Virgin, and that bright Star she hath in her left hand, the Greeks call an ear of Corne, the whole Constel-

Constellation consisteth of twenty six Stars besides the six unformed.

Of the Constellation of the Southerne Hemisphære, and first of those in the Zodiack.

First *Libra*, which is the seventh, in order of the signes, *Libra*, was not reckoned anciently among the signes, till that the later Astronomers robbing the Scorpion of his claws translated the same to *Libra*, and made up the number of the signes; this Constellation containeth in it 8 Stars, besides 9 other unformed belonging to it.

The eight is *Scorpio*, the Scorpion, this Constellation consisteth of 21 Stars, besides three unformed.

The ninth is *Sagittarius* the Archer, it hath in it thirty one Stars.

The tenth is *Capricornus* the Goat, to this Constellation they attribute 28 Stars,

The eleventh is *Aquarius* the Water-man, it containeth in all 42 Stars:

The twelfth is *Pisces* the Fishes, it containeth 34 Stars, and 4 unformed.

Of the Constellations of the Southerne Hemisphære which are without the Zodiack

The first is *Cetus*, the Whale; consisting of 22 Stars.

The second is *Orion* which the Arabians call sometimes the mad-man, sometimes a strong-man or Gyant; it consisteth of 38 Stars, it is called the mad-man, because that when this Constellation riseth with the Sun it causeth great store of tempestuous weather in all places.

The third is *Eridianus*, the River, it hath in it 34 Stars.

The fourth is *Lepus*, the Hare; it containeth 12 Stars.

The fifth is *Canis*, the Dogge; this Constellation hath in it 11 Stars.

The sixth is the little Dogge *Anti Canis* in Latine, because it riseth before the great Dogge; this Asterisme consisteth of two stars only.

The seventh is *Argo*, the Ship ; the whole Afterisme containeth in it 45 Stars.

The eight is *Hydra*, it hath in it 15 Stars besides two unformed.

The ninth is *Crater*, the Cup, it hath in it 7 Stars.

The tenth is *Corvus*, the Crow, consisting of 7 Stars.

The eleventh is *Centaurus*, the Centaure, it containeth 37 Stars.

The twelfth is *Pern*, the wild beast, to this Constellation they reckon 19 stars.

The thirteenth is *Ara*, the Altar, it containeth 7 stars.

The fourteenth is *Corona australis*, the south Crown, it consisteth of 13 stars.

The fifteenth is *Pisces austrinus*, the South-fish, it containeth in it 13 stars.

There is also described in the Cælestiall Globe, a certaine broad Zone or Circle, of the colour of Milke, which representeth that which appeareth in the Heavens, and is called, *Via Lactea*, the milky way, which Zone or Circle is not drawn regularly or equally, either in respect of latitnde, colour, or frequency of stars, but indifferent and various both in forme and scituation, in some places appearing but as a single Circle, and againe in others seeming as it were dividing in two parts, the delineation whereof you may see in the Globe.

Now the whole firmament, reckoning in the Northerne and southerne Hemispheres together with the Zodiack, containeth in all 1022 stars which make up 48 Afterismes or constellations.

How to make a Sun Dyall by the Globe for any latitude of place.

FOR the making of a plaine Horizontall dyall, having first prepared your flat dyall ground parallel to the Horizon, draw a Meridian on it as exactly North and South as possibly you can, which done, draw another East and West, which must crosse it at right Angles ; The first of which lines will shew 12, and the other six of the Clock both morning and evening. Then making a Center in the interfection of these two lines, describe a Circle on your dyall to what distance you please, and then divide it as all other Circles usu-

ally are into 360 parts and it will not be amisse to sub-divide each of these into lesser parts if it may be conveniently done. And now it only remaines to finde out the distances of the hour lines in this Circle, for any latitude of place, which that we may doe by the use of the Globe, let it first be set to the Latitude of the place assigned, and then make choice of some of the greater Circles in the Globe that passe through the Poles of the world. As for example, The *Æquinoctiall* colour if you please, and apply the same to the Meridian, in which scituation it sheweth the mid-day, or 12 a Clock, then turning about the Globe toward the West (if you will) till that 15 degrees of the *Æquator* have passed through the Meridian: you must marke the degree of the Horizon, that the same colour crosseth in the Horizon, for that point will shew the distance of the first and 1st h^{ours} from the Meridian both of which are distant an h^{ours} space from the Meridian, or line of Mid-day; then turning againe the Globe forward till other fifteen degrees are past the Meridian, the same Colour, will point out the distance of the 10th hour, which is 2 hours before noon, and of the second h^{our} after noon; and in the same manner may you find out the distances of all the rest in the Horizon, allotting to each of them 15 degrees in the *Æquator*, crossing the Meridian; but here you must take notice by the way, that the beginning of this account of the distances, must be taken from that part of the Horizon on which the Pole is elevated, to wit, from the North-part of the Horizon, if the Artick Pole be elevate, and so likewise from the South part, if the Antartick be elevated.

The distances of the h^{ours} being thus noted in the Horizon of the Globe, you must afterward translate them into your plaine allotted for your dial ground, reckoning in the circumference of it so many degrees to each h^{our} as are answerable to those pointed out by the Colour in the Horizon; and lastly, having thus done the Gnomon or Stile must be erected, where you are to observe this one thing, which is indeed the chiefe thing to be carefully looked unto, namely, that that edge or line of the Gnomon, which is to shew the h^{ours} by its shadow in all kinds of Dials must be set parallel to the Axis of the world, that so it may make an angle of inclination

tion, with its plain ground equall to that which the Axis of the world makes with the Horizon, now that the stile is to stand directly to the North and South, or the Meridian line is a thing commonly knowne.

Now if you would make a plaine erect dyall perpendicular to the Horizon, which is commonly called a *Murall*, and respecting either the North or South, you must remember this one thing, that that which is an erect dyall in one place will be a horizontall in another, whose Zenith is distant from that place 90 degrees either Northward or Southward.

And so likewise by this rule may be made any manner of inclining dyall, if so be that the quantity of the inclination be but knowne, as for example, if a dyall be made on a plaine ground, whose inclination is ten degrees from the Horizon Southward, and for a place whose latitude is for 52 gr. Northward, you must describe it in that plaine and horizontall diall for the latitude of 62 degrees Northward, and if in the same Latitude the diall ground doe incline toward the North 16 gr. you must take an horizontall dial for the Northerne latitude of 36 gr.

And thus much for making dials by the Globe.

FINIS.

A new Play at cardes, by vertue whereof Children or others may with facility and delight, learne both to read and write, and also to spell, and Pronounce, the hardest names in the Bible, as also to know how to read and write the Calde, Syriack, Arabick, Hebrew, and Greek Characters.

All this to be learnt and Play.

Sold by *Tho. Jenner* at the South entrance of the Old Exchange, 1657.

